

**California Energy Commission
Energy in Agriculture Program**

Precision Agricultural Tools Development

Goal: This project will continue the development and demonstration of electronic navigation and control technology to reduce the application rates of chemicals and/or water during field application.

Technology Path: Design, develop, and test prototype electronic interface between the GPS and the pulse-spray control module. Demonstrate the ability of the technology to minimize spray drift while applying chemicals in accordance with the input map (GIS). At the completion of this task the researcher expects the technology to be ready for commercialization. At this point, UC Davis has already acquired a commercial partner, Capstan agricultural Systems, Inc., who has licensed some of the technology and is interested in future refinements. The researchers anticipate that the technology will reach the market in 12-24 months time.

Energy Efficiency Benefits: Potential energy efficiency benefits to be gained from this research are 10% to 30% reduction in chemical use resulting in 25.2 to 75.6 million Btu's per year.

Technical Objectives:

Improve productivity and efficiency of agricultural production, and reduce wastage of chemical and water during irrigation periods while protecting the environment from leaching and nutrient discharge.

Economic Objective:

Achieve sufficient energy and other production-cost savings to reach a positive return on investment for the proposed precision farming technologies.

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- Image Collection and Analysis System: The image analysis system enables the investigators to measure and analyze the deposit of spray droplets (simulating agrochemicals) on sample cards on the field surface, and produce maps of the performance of the pulsed spray technology thus providing “ground truth” information. The technique has proven reliable and accurate in field use. This quarter, a scheduled upgrade of the software has been made.
- Case New Holland Vehicle: There continues to be strong cooperation with Case New Holland. Case has provided a new, state-of-the-art spray vehicle with GPS, guidance system and spray controller.
- Data Collection System: Investigators have refined a mobile data collection system to allow detailed recording of operational data. Investigators have continued cooperation with Trimble Navigation. They have provided a field computer for use with the project and worked with the investigators to interface an on-board weather collection system for spray drift analysis. Additionally, the investigators have a prototype spray controller from Raven Industries that is an industrial step toward technology transfer of quality control mapping.
- Field Trials: Field trials established the value of using weather data and droplet size control for managing precision placement of agrochemicals, and enabled the investigators to develop comparisons of the new technology versus the conventional technology.
- Commercialization: Case New Holland is using data and results from this project for marketing and education. Investigators have published a paper in the ASTM (American Society for Testing and Materials) in cooperation with one of their industrial partners (Capstan Ag Systems, Inc.).
- Outreach: Numerous presentations on the results of the project have been made at scientific and grower meetings. The project results and anticipated benefits to agriculture were presented at the grower meetings in Fresno, Sutter and Glenn Counties. Two manuscripts from project work have been accepted for publication and one has been revised in accordance with reviewers’ comments; investigators expect acceptance soon.

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